

Serial No.: 09/848,997
Group Art Unit: 2822

AMENDMENTS TO CLAIMS

- Please amend pending claims 2 and 8 as indicated below. A complete listing of all claims and their status in the application are as follows:

1. (cancelled)

2. (currently amended) A method for planarization of an ILD layer on a semiconductor wafer comprising:

providing an oven having a wafer holder provided therein ;

placing the semiconductor wafer on the wafer holder;

rotating the wafer holder to apply a first rotary motion to the semiconductor wafer thereon;

applying mechanical pressure to the ILD layer on the semiconductor wafer having the first rotary motion using a mechanical device, the applying the mechanical pressure includes providing a second rotary motion and a traverse motion between the mechanical device and the ILD layer on the semiconductor wafer to assist in planarization[[:]] whereby the ILD layer on the semiconductor wafer is stretched to give rise to a linear molecular arrangement therein; and

applying heat to the ILD layer on the semiconductor wafer using the mechanical device simultaneously with the applying the mechanical pressure to cause reflow of the ILD layer in a thermal mechanical planarization process.

3. (previously presented) The method as claimed in claim 2 wherein: applying the mechanical pressure includes providing non-sticking motion and transferring heat between the mechanical device and the ILD layer on the semiconductor wafer to assist in planarization.

4. (previously presented) The method as claimed in claim 2 wherein: applying the heat includes sensing and controlling the temperature of the mechanical device.

Serial No.: 09/848,997
Group Art Unit: 2822

5. (previously presented) The method as claimed in claim 2 wherein:
applying the mechanical pressure uses a top plate as part of the mechanical device.
6. (previously presented) The method as claimed in claim 2 wherein:
applying the mechanical pressure uses a roller as part of the mechanical device.
7. (cancelled)
8. (currently amended) A method for planarization of an ILD layer on a semiconductor wafer comprising:
providing an oven having a rotatable wafer holder provided therein;
placing the semiconductor wafer on the wafer holder;
rotating the wafer holder to apply a first rotary motion to the semiconductor wafer thereon;
spinning on the low dielectric constant ILD material on to the semiconductor wafer in the oven;
soft baking the low dielectric constant ILD material at a soft bake temperature in the oven;
holding the low dielectric constant ILD material at a temperature below the hard bake temperature in the oven;
applying mechanical pressure to the ILD layer on the semiconductor wafer having the first rotary motion using a mechanical device to apply rotating pressure to the ILD layer in the oven, the applying the mechanical pressure includes providing a second rotary motion and a traverse motion between the mechanical device and the ILD layer on the semiconductor wafer to assist in planarization[[:]]
whereby the ILD layer on the semiconductor wafer is stretched to give rise to a linear molecular arrangement therein;
applying heat to the ILD layer on the semiconductor wafer through the mechanical device simultaneously with the applying the mechanical pressure in the oven to cause reflow of the ILD layer;
hard baking the low dielectric constant ILD material at a hard bake temperature in the oven;

Serial No.: 09/848,997
Group Art Unit: 2822

cooling the low dielectric constant ILD material in the oven; and
annealing the low dielectric constant ILD material in the oven.

9. (previously presented) The method as claimed in claim 8 wherein:
applying the mechanical pressure includes providing non-sticking sliding motion and
transferring heat between the mechanical device and the ILD layer on the
semiconductor wafer to assist in planarization.
10. (previously presented) The method as claimed in claim 8 wherein:
applying the heat includes infrared sensing and controlling the temperature of the
mechanical device through a phase lock loop temperature control.
11. (previously presented) The method as claimed in claim 8 wherein:
applying the mechanical pressure uses a rotating and transversely moving top plate as
part of the mechanical device; and
applying the mechanical pressure is applied to cause reflow of the ILD layer.
12. (previously presented) The method as claimed in claim 8 wherein:
applying the mechanical pressure uses a rotating and transversely moving roller as part
of the mechanical device; and
applying the mechanical pressure is applied to cause reflow of the ILD layer.
13. (previously presented) The method as claimed in claim 8 wherein:
holding the low dielectric constant ILD material at a temperature below the hard back
temperature in the oven holds the temperature between 100°C and 400°C; and
exhausting volatile gases from the ILD material from the oven.
14. (previously presented) The method as claimed in claim 8 wherein:
applying mechanical pressure uses a mechanical device having a consumable surface
in contact with the semiconductor wafer.
15. (withdrawn) An apparatus for planarization of ILD layers on a
semiconductor wafer comprising:
an oven;
a wafer holder provided in the oven; and

Serial No.: 09/848,997

Group Art Unit: 2822

a mechanical device for simultaneously applying mechanical pressure and heat to the ILD layer on the semiconductor wafer.

16. (withdrawn) The apparatus as claimed in claim 15 wherein:
the mechanical device includes a mechanism for providing relative motion between the mechanical device and the ILD layer on the semiconductor wafer to assist in planarization.
17. (withdrawn) The apparatus as claimed in claim 15 wherein:
the mechanical device includes a mechanism for providing non-sticking motion and transferring heat between the mechanical device and the ILD layer on the semiconductor wafer to assist in planarization.
18. (withdrawn) The apparatus as claimed in claim 15 wherein:
the mechanical device includes circuitry for sensing and controlling the temperature of the mechanical device.
19. (withdrawn) The apparatus as claimed in claim 15 wherein:
the mechanical device includes a top plate for applying mechanical pressure.
20. (withdrawn) The apparatus as claimed in claim 15 wherein:
the mechanical device includes a roller for applying mechanical pressure.